

## SOME TETRAMERIDAE (NEMATODA: SPIRURIDA) FROM AUSTRALIAN BIRDS

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### Summary

MAWSON, P. M. (1979) Some Tetrameridae (Nematoda: Spirurida) from Australian birds, *Trans. R. Soc. S. Aust.* **103**(7), 177-184, 30 November, 1979.

*Tetrameres* (*Petrowimeres*) *anseranas* n.sp. described from *Anseranas semipalmata* is a large species with two rows of spines throughout the body length, left spicule 1/4-1/5 body length, spicule ratio 20-22. *T. (Gynaecophila) davelonls* n.sp. described from *Dacelo novaeguineae* is a small species with four rows of spines, of which dorso-lateral are incomplete, and a single spicule. *T. (Tetrameres) greeni* n.sp., (syn. *T. pelecani* in part), and *Microtetrameres pelecani* (syn. *Tetrameres pelecani*) are described from *Pelecanus conspicillatus*, and their synonymy discussed. *T. greeni* is distinguished from congeners by presence of caudal alae in the male. *M. pelecani* Skrjabin is a probable secondary homonym of *M. pelecani* (Johnston & Mawson).

Other records are of the species *T. globosa* Linstow and *T. gubanovi* Shigin.

### Introduction

Most of the nematodes recorded here were taken from birds dissected by the author; others were donated by other collectors. Some Tetrameridae from Australian birds have already been described, and those dealt with here are additional ones (Johnston & Mawson 1941, 1949, 1951; Mawson 1968, 1977).

Chabaud (1975) divides the Tetrameridae into subfamilies, and places *Microhadjelia* Jøgis and *Tetrameres* Creplin in the Tetramerinae. *Microtetrameres* he considers a subgenus of *Tetrameres*, on the grounds that the head structures of the two groups are similar though not sufficiently studied. In practice however they are readily separable, the females by the body shape, and the males usually by the type and arrangement of the caudal papillae, though this latter is noted more easily in the actual specimen than in line drawings. *Microtetrameres* is retained as a genus here.

Chabaud also refers to the unsatisfactory definitions for the subgenera usually attributed to these genera. In the case of *Tetrameres*, the three subgenera have in the past been sepa-

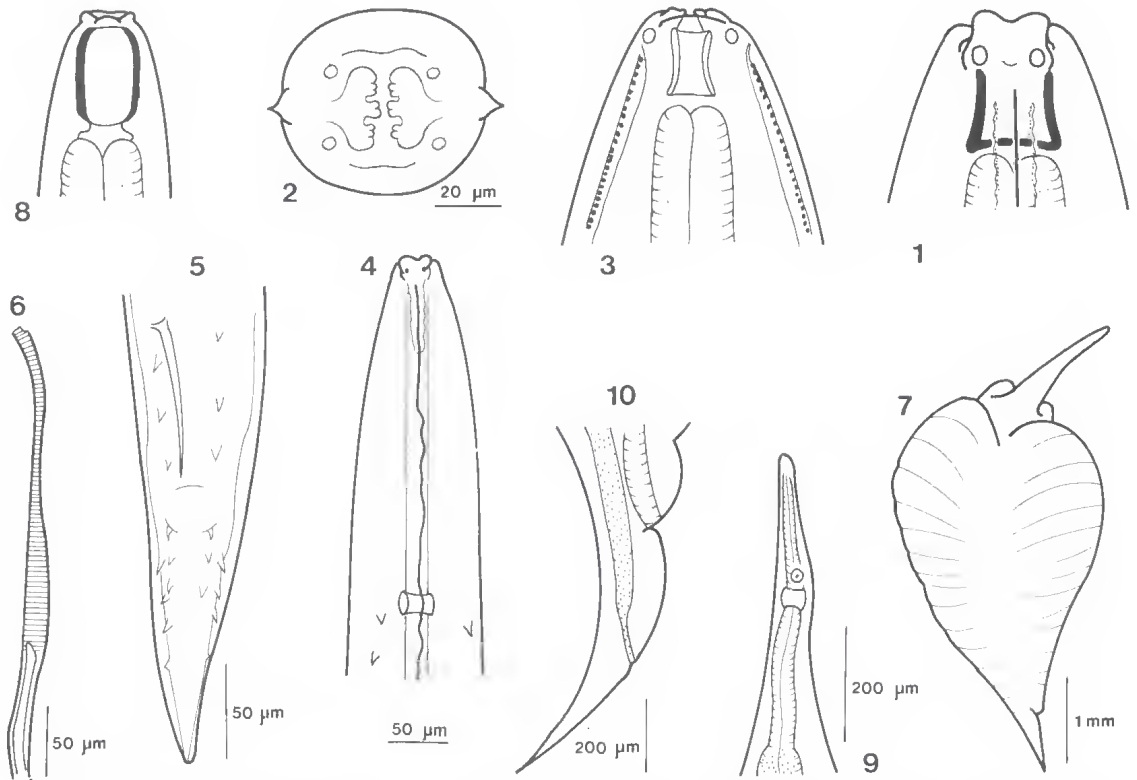
rated by the absence of body spines (*Gynaecophila*) and by the presence (*Petrowimeres*) or absence (*Tetrameres*) of lateral cuticular appendages; however as Chabaud (1975) and Møllhagen (1976)<sup>1</sup> state, the spines are sometimes very few and/or very small. Møllhagen after examining representatives of many species, separates the three subgenera by the absence (*Tetrameres*) or presence, of dorsal and ventral labia, and further by the presence (*Petrowimeres*) or absence (*Gynaecophila*) of anterior lateral flanges (lateral cuticular appendages or cordons of some authors).

In the case of *Microtetrameres*, a subgenus *Gubernacules* has been proposed for species in which there is a gubernaculum; this structure is sometimes distinct, but in many cases indefinite, so that this is an unsatisfactory subdivision, and is not used here.

The specific identification of either *Microtetrameres* spp. or *Tetrameres* spp. from females only is, at the present state of knowledge, impossible. In cases where only the female is present in collections listed below, identification rests only on similarity to other

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<sup>1</sup>Møllhagen, T. R. (1976) A study of the systematics and hosts of the parasitic nematode genus *Tetrameres* (Habronematoidea: Tetrameridae). Dissertation in Zoology, Graduate Faculty of Texas Tech. University.



Figs. 1-10. *Tetrameres anseranas*. Figs. 1-3. Head of male, in lateral, en face and median views. Same scale. Fig. 4. Anterior end of male. Fig. 5. Posterior end of male. Fig. 6. Proximal end of left spicule. Fig. 7. Female, entire. Fig. 8. Head of female. Fig. 9. Anterior end of female. Fig. 10. Posterior end of female.

females occurring with males. Points considered in comparison of females are the shape and size of the buccal capsule and of the egg.

Two of the species described below are from the Australian pelican. The only record of Tetrameridae from this host is that of *Tetrameres pelecani* Johnston & Mawson (1942a) described from one male, and later redescribed by them (1942b) from three males and a young female. Mollhagen (1976) considered *T. pelecani* incertae sedis, pointing out that the narrow buccal capsule and few caudal papillae described for the single male of the original description were not typical for the genus. Further, though the second description noted more caudal papillae, it also noted the presence of narrow caudal alae, not otherwise recorded for the genus, and moreover that there are discrepancies in the measurements given in the two descriptions. Recent collections from pelicans include female *Tetrameres* and female *Microtetrameres* (sometimes in the same host bird) and with them two species of male tetramerids, neither provided with body

spines. These males have been compared with the specimens previously identified as *T. pelecani* (Johnston & Mawson 1942a, 1942b). One is identified as *Microtetrameres* sp. because of the number, arrangement, and shape of the caudal papillae. This is similar to the single male first described as *Tetrameres pelecani*, and this species must now be transferred to *Microtetrameres*.

The other species of male is referred to *Tetrameres*. The head structure, spicules, shape of the tail and type of caudal papillae, all agree with this genus. Although there are narrow caudal alae, not previously described for *Tetrameres*, the specimens are now described as a new species of the genus. The specimens identified as *T. pelecani* by Johnston & Mawson (1942b) have been examined and belong to this species.

***Tetrameres* (*Petrowimeres*) *anseranas* n.sp.**

FIGS 1-10, 33-35

Host and localities: *Anseranas semipalmata* (Latham), from Humpty Doo, N.T. (12♂, 41♀).

Male: Body length 7.6–9.2 mm. Anterior flanges present, 90–120  $\mu\text{m}$  long, poorly developed and without freely projecting ends posteriorly, much more clearly seen in S.E.M. preparation (Fig. 33). Lateral alae present, commencing at bases of pseudolabia and extending nearly to cloaca, each supported in region of flange by intracuticular sclerotised rod. Body spines in two subventral rows, most anterior spine just behind level of nerve ring, two rows continuing to cloaca; spines about same size throughout body length but closer together in oesophageal region.

Head with two lateral pseudolabia and dorsal and ventral labia. Pseudolabia depressed in lateral line so that they appear bilobed. Labia strongly cuticularized. Three bilobed teeth on inside of each pseudolabium. Cervical papillae 280–310  $\mu\text{m}$  from head, each trifid, central spine the longest (Fig. 34).

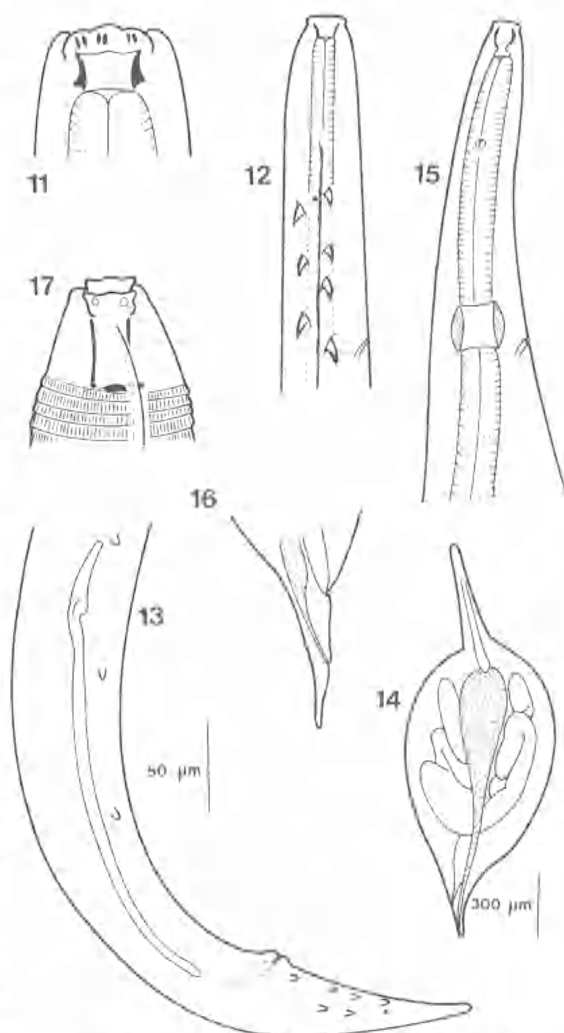
Buccal capsule 30–35  $\mu\text{m}$  long, lateral diameter 12  $\mu\text{m}$ , dorso-ventral 22  $\mu\text{m}$ . Muscular part oesophagus not clearly demarcated from glandular. Nerve ring at 380–400  $\mu\text{m}$  from head, excretory pore just behind this.

Tail 300–380  $\mu\text{m}$  long, tapering to rounded end. Caudal papillae digitiform, three pairs subventral and three pairs sublateral (Fig. 5). Phasmids present. Left spicule 4.6–5.5 mm long, with cylindrical hilt (Fig. 6) 230–250  $\mu\text{m}$  long. Right spicule 155–200  $\mu\text{m}$  long, its proximal end slightly expanded. Spicule ratio 20–30. Gubernaculum absent. In a few specimens left spicule completely absent, and in one of these a piece of (?) spicule sheath projects from cloaca, indicating that the spicule has been completely everted and has broken away.

Female: Body pear-shaped, with widest part anterior to midlength. Total length up to 5.7 mm, maximum diameter 2.3 mm. Lips not as prominent as in male, but dorsal and ventral labia distinct. Buccal capsule cylindrical, narrower at each end, 26–28  $\mu\text{m}$  long, 36–37  $\mu\text{m}$  external width at midlength. Oesophagus about 2.0 mm long, its muscular part 500–530  $\mu\text{m}$ . Nerve ring 240–250  $\mu\text{m}$  from head, excretory pore just behind this. Cervical papillae setiform, distinct, not trifid, just in front of nerve ring.

Tail 380–440  $\mu\text{m}$  long, tapering to blunt point. Vulva 700–830  $\mu\text{m}$  from posterior end. Embryonated eggs bi-operculate, without polar filaments, 50–55  $\mu\text{m}$  long, 20–22  $\mu\text{m}$  wide.

In measurements *T. anseranas* is closest to *T. australis* Johnston & Mawson but in this



Figs. 11–16. *Tetrameris dacteloni*. Fig. 11. Head of male. Fig. 12. Anterior end of male. Fig. 13. Posterior end of male. Fig. 14. Female, entire. Fig. 15. Anterior end of female. Fig. 16. Posterior end of female.

Fig. 17. *Tetrameris gubanovi*. Anterior end. (Figs. 12, 13 & 15 to same scale).

species there are four rows of spines. The only other species in which there are both lateral flanges and two rows of spines is *T. Indiana* Ali, and in this the left spicule is much shorter and the spicule ratio less. As the flanges in *T. anseranas* are so poorly developed and may easily be missed, it has been compared with species without flanges but with two complete rows of spines, but differs from any of these in the length of the left spicule and the large body size.

**Tetrameres (Gynaecophila) daceionis** n.sp.

FIGS 11–16

Host and localities: *Dacelo novaeguineae* (Hermann) from Brisbane, Qld (1 ♂, 20 ♀); A.C.T. (2 ♀).

Male: Length 2.6 mm. Lateral alae present, from just anterior to cervical papillae to about two thirds body length. Four rows of well developed spines, the first at level of cervical papillae (Fig. 12); dorsal rows end about 1820  $\mu\text{m}$  from head, and spines in all rows much smaller, papilla-like and more sparse from about 1250  $\mu\text{m}$  from head. Oesophagus 580  $\mu\text{m}$  long, its muscular part 210  $\mu\text{m}$ ; nerve ring 130  $\mu\text{m}$ , cervical papillae 105  $\mu\text{m}$ , and excretory pore 190  $\mu\text{m}$ , from anterior end of worm. Buccal capsule well sclerotised, 12  $\mu\text{m}$  long, 12  $\mu\text{m}$  maximum external diameter. Dorsal and ventral labia present, pseudolabia trilobed. Teeth apparently present, seen only in lateral view.

Single spicule 280  $\mu\text{m}$  long, its hilt 50  $\mu\text{m}$  long (Fig. 13). Tail 115  $\mu\text{m}$  long, caudal papillae elongate, four pairs subventral, two pairs lateral.

Female: Gravid female widest anteriorly, tapering more or less gently to tail, depending on number of eggs. Total length up to 2.4 mm (Fig. 14). Oesophagus up to 800  $\mu\text{m}$  long. In specimen with oesophagus 700  $\mu\text{m}$ , muscular part of oesophagus 290  $\mu\text{m}$ , distance from anterior end of nerve ring 170  $\mu\text{m}$ , of cervical papillae 80  $\mu\text{m}$ , of excretory pore 135  $\mu\text{m}$ . Buccal capsule barrel shaped, 15  $\mu\text{m}$  long, 11  $\mu\text{m}$  external diameter at widest part.

Body tapering from vulva to rounded point at tip of 110  $\mu\text{m}$  long tail, with pair of elongate phasmids 80  $\mu\text{m}$  from tip. Vulva 250  $\mu\text{m}$  from anus. Embryonated eggs 45–48  $\mu\text{m}$  by 21–22  $\mu\text{m}$ , without opercular or polar filaments.

The only record of *Tetrameres* sp. from Alcedinae is of one female, not identified to species, from *Megaceryle alcyon*, U.S.A. (Mollhagen 1976). *T. prozeskyi* Ortlepp has been recorded from two hornbills (*Lophoceros* spp.) and *Tetrameres* sp. from *Merops* sp. (Borgarenko 1960).

The measurements of the male from *Dacelo* are close to those given by Ortlepp (1964) and Mollhagen (1976) for *T. prozeskyi*, but the spines in the latter species start just behind the head, and are distinctly larger; moreover there are no dorsal or ventral labia.

**Tetrameres gubanovi** Shigin

FIG. 17

*Tetrameres gubanovi* Shigin, 1957, p. 256. From *Colymbus cristatus*, USSR (2 ♂).

Host and localities: *Podiceps cristatus* L., Goolwa and Purnong, S. Aust. (8 ♂, 10 ♀); *Tachybaptus novaehollandiae* (Stephens), Barren Box Swamp, N.S.W. (2 ♂, 3 ♀).

*T. gubanovi* is the only species recorded in which there are short longitudinal striae on each cuticular annulus at the anterior end of the body, giving a striking appearance (Fig. 17). In the present specimens these striae continue, becoming less distinct, over about two thirds of the oesophageal region.

The measurements of the male worms from the hosts given above are: length 6.5–7.4 mm, oesophagus 1300–1350  $\mu\text{m}$ , left spicule 4.0–4.8 mm, right spicule 150–180  $\mu\text{m}$ , spicule ratio 24–26, tail 380–400  $\mu\text{m}$ . The most anterior hooks lie about 300  $\mu\text{m}$  from the head; there are four pairs of subventral and three pairs of sublateral caudal papillae.

**Tetrameres globosa** Linstow

FIG. 36

*Tetrameres globosa* Linstow, 1879, p. 175, from *Fulica atra*.

Hosts and localities: *Porzana pusilla* (Pallas), Beachport, S. Aust. (6 ♂, 2 ♀); *P. fluminea* (G.), Glenelg (5 ♂), Mt Mary (1 ♀); Beachport (6 ♂), L. Alexandrina (6 ♂, 12 ♀) S. Aust.; Alice Springs, N.T. (1 ♀); *P. tabuensis* (Gmelin), Langhorne Creek, S. Aust. (3 ♂).

The specimens listed above agree generally with records tabulated by Mollhagen (1976). The differences are small—the tip of the left spicule is rounded, not pointed, and there are very narrow lateral alae. Measurements: males: 1.9–2.5 mm long, oesophagus 560–900  $\mu\text{m}$  (1/2.8–3.4 of body length); single spicule 190–310  $\mu\text{m}$  long, with hilt 30–38  $\mu\text{m}$ ; tail 150–180  $\mu\text{m}$ .

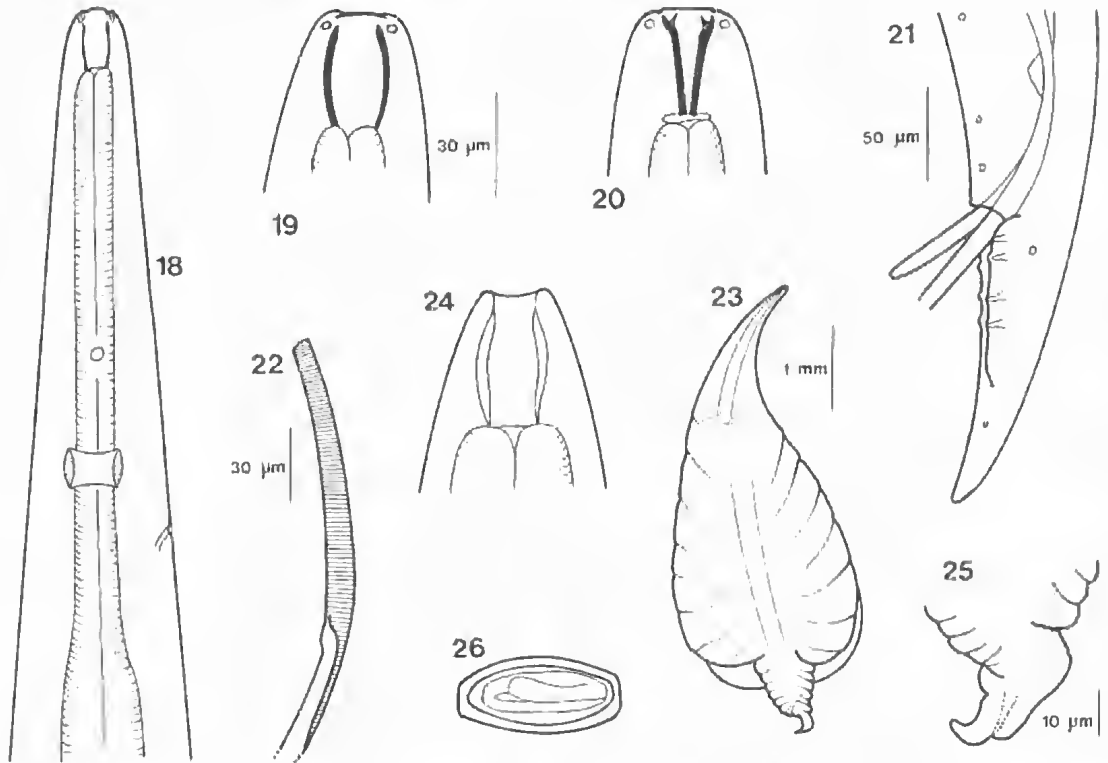
**Tetrameres (Tetrameres) greeni** n.sp.

FIGS 18–26

syn. *Tetrameres pelecanti* sensu Johnston & Mawson, 1942b, p. 185, nec 1942a.

Host and localities: *Pelecanus conspicillatus* Temminck, Brisbane, Qld.

Male: Length 4.4–6.2 mm. Head with low trilobed lateral lips, no dorsal or ventral lips. Mouth oval, teeth represented by four submedian cuticular ridges. Buccal capsule 30–35  $\mu\text{m}$  long, wider dorso-ventrally than from side to side. Oesophagus 800–1100  $\mu\text{m}$  long, about a fifth to a sixth of body length, with muscular



Figs. 18-26. *Tetrameres greeni*. Fig. 18. Anterior end of male. Figs. 19, 20. Lateral and median views of head of male. Fig. 21. Posterior end of male. Fig. 22. Proximal end of left spicule. Fig. 23. Female, entire. Fig. 24. Head of female. Fig. 25. Posterior end of female. Fig. 26. Embryonated egg. (Figs. 19, 20, 23 & 25 to same scale; Figs. 18 & 21 to same scale).

part 290–330  $\mu\text{m}$  long. Cervical papillae, nerve ring, and excretory pore respectively 175–200  $\mu\text{m}$ , 200–230  $\mu\text{m}$  and 220–280  $\mu\text{m}$  from anterior end.

Lateral alae absent, and no somatic spines observed but two subventral rows of very small papillae extend from cloaca to about proximal end of left spicule. Tail rounded at tip. Four pairs of elongate post-anal subventral papillae supported by distinct narrow alae and a pair of lateral papillae on the proximal half of tail and a pair of phasmids on distal half.

Left spicule 800–1000  $\mu\text{m}$  long, about a fifth to a sixth body length, with long cylindrical hilt (90–100  $\mu\text{m}$ ). Right spicule 125–200  $\mu\text{m}$  long. Spicule ratio 5.0–7.7. Gubernaculum absent.

Female: Largest females somewhat pear-shaped, with thickest part of body posterior to midlength. Overall length of body up to 5.5 mm, maximum width 2 mm. Buccal capsule barrel-shaped, 33–35  $\mu\text{m}$  long, diameter 20–21  $\mu\text{m}$  at widest part. Oesophagus 1400–1900  $\mu\text{m}$

long, its muscular part 310–500  $\mu\text{m}$  long. Nerve ring 200–300  $\mu\text{m}$  from head. Excretory pore just behind nerve ring.

Body narrows suddenly a little in front of a vulva, is strongly constricted at vulva, then tapers to tip of tail; body posterior to vulva directed dorsally in all specimens (Fig. 25). Tail 100–120  $\mu\text{m}$  long, vulva 200–300  $\mu\text{m}$  in front of anus. Embryonated eggs 44–45  $\mu\text{m}$  by 20–23  $\mu\text{m}$ ; polar threads absent, thickened shoulders at each end suggest presence of opercula but these not visible.

The male of this species is distinguished from all others described for the genus by the presence of caudal alae. Apart from the alae, it seems closest to the four species grouped by Mollhagen (1976) as the 'microspinosa group', characterised by the absence of lateral alae, somatic papillae in two incomplete rows, basic arrangement of caudal papillae four subventral, one lateral on each side. These species are *T. microspinosa* Viguerras, *T. butorides* Mollhagen, *T. eleyi* Mollhagen and *T. ftehartyi*

Mollhagen. The measurements of the Australian species, and the arrangement of the somatic papillae, do not agree with any of these.

The three male worms from which the 'amended' description of *T. pelecani* were made (Johnston & Mawson 1942b) have been examined and appear to belong to *T. greeni*.

***Microtetrameres pelecani* (Johnston & Mawson)**

FIGS 27-32

Syn. *Tetrameres pelecani* Johnston & Mawson, 1942a, p. 72; ?*T. pelecani* Skrjabin, 1949.

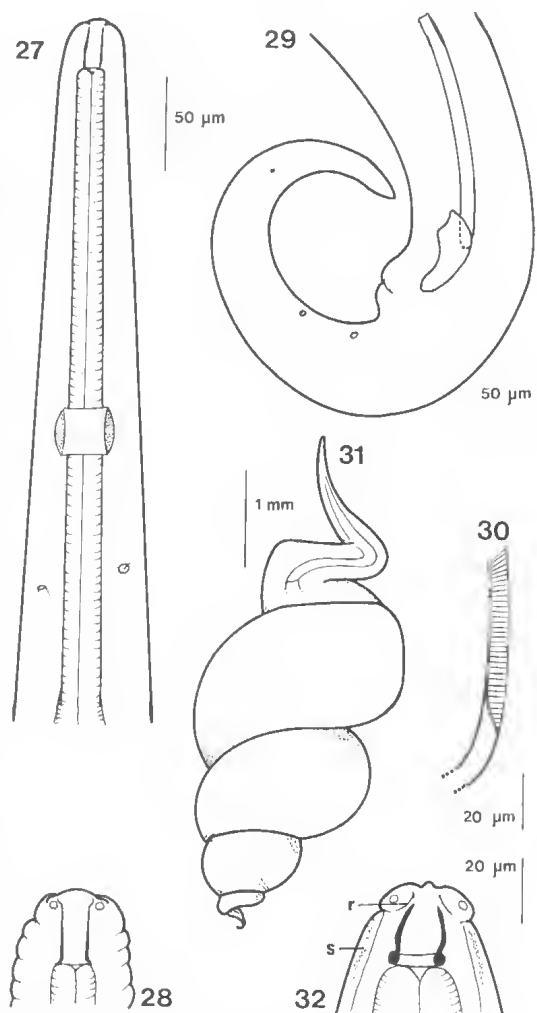
Host and localities: *Pelecanus conspicillatus*, Brisbane, Qld.

Male: Length 6.9-8.7 mm. Buccal capsule 21-25  $\mu\text{m}$  long, slightly wider dorsoventrally than from side to side. Oesophagus 1700-1900  $\mu\text{m}$  long, about a quarter of the body length. In most specimens end of muscular part of oesophagus and positions of nerve ring, excretory pore and cervical papillae are not clear, but in one with oesophagus 1850  $\mu\text{m}$  long, muscular oesophagus is 370  $\mu\text{m}$ , nerve ring, excretory pore and cervical papillae are respectively 220  $\mu\text{m}$ , 280  $\mu\text{m}$ , and 270  $\mu\text{m}$  from anterior end of the worm.

Tail 300-350  $\mu\text{m}$  long, with simple rounded tip, with two pairs of papillae near cloaca and pair of phasmids at about midlength. No pre-cloacal papillae seen. Left spicule 1350-1650  $\mu\text{m}$  long with rounded tip and slight bend in proximal end, just below 60-70  $\mu\text{m}$  long hilt. Right spicule 150-200  $\mu\text{m}$  long. Well developed guberculum about 50-60  $\mu\text{m}$  long, present in all specimens. Spicule ratio 8-9, and ratio of body length to that of left spicule 4.2-5.8.

Female: Body coiled in elongate spiral, largest ones from 4.1-5.0 mm long and 2.2-2.5 mm wide, from which anterior end projects up to 2.3 mm, but posterior end included in spiral, except for terminal 300  $\mu\text{m}$ .

Head with trilobed lateral lips of which submedian lobes are largest. Inside of lips with thickened ridges extending from central lobe backwards onto submedian lobes (Fig. 32,r). Buccal capsule 20-25  $\mu\text{m}$  long, widest near its posterior end, and ending in thickened ring. Some sclerotisation within cuticle of anterior end, behind lips, in dorsal and ventral fields (Fig. 32,s). Oesophagus 2.2-2.5 mm long, muscular part 400-410  $\mu\text{m}$  long, widens shortly in front of nerve ring. Nerve ring 200-230  $\mu\text{m}$  from head, excretory pore near posterior end

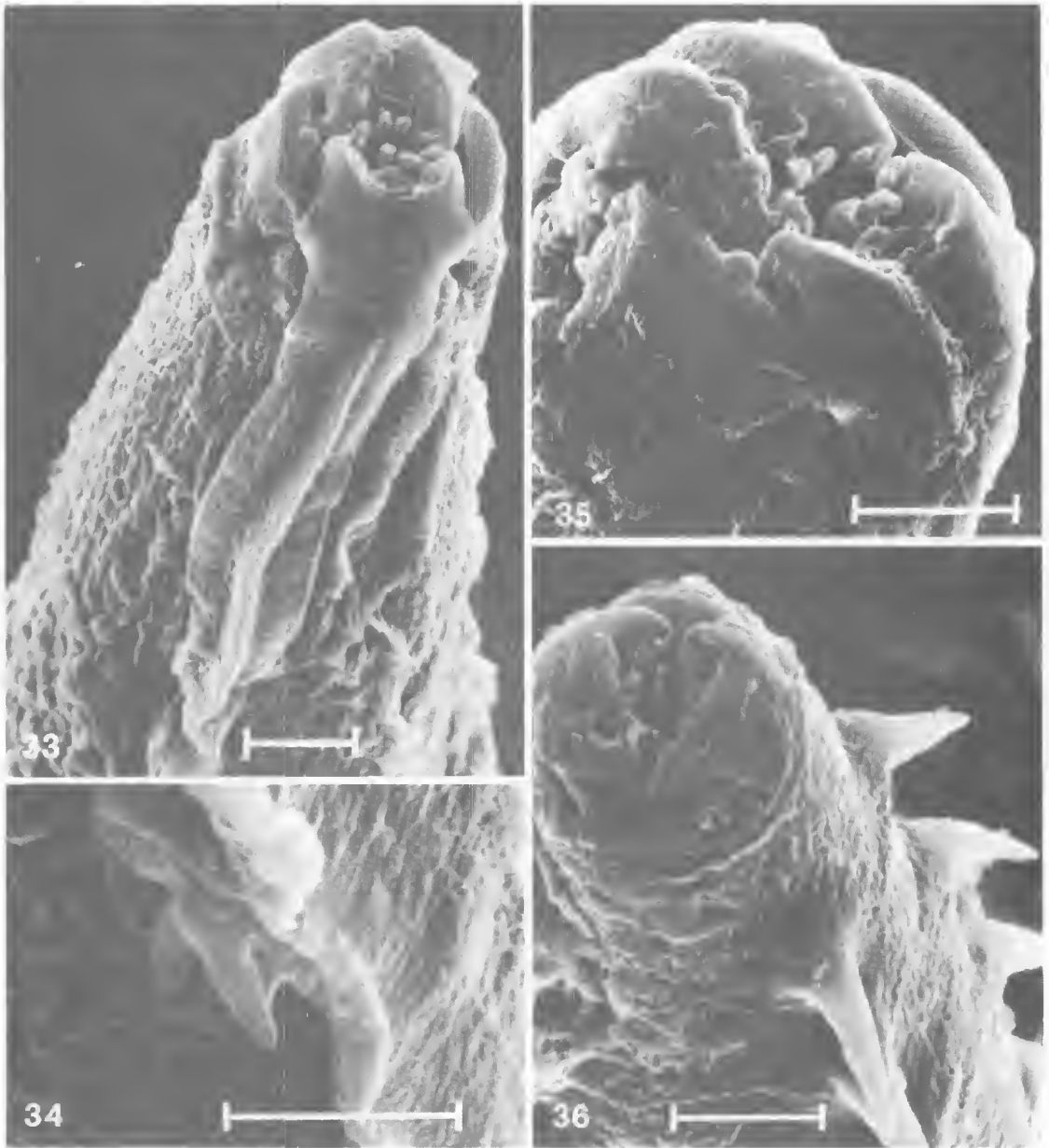


Figs. 27-32. *Microtetrameres pelecani*. Fig. 27. Anterior end of male. Fig. 28. Head of male. Fig. 29. Posterior end of male. Fig. 30. Hilt of left spicule. Fig. 31. Female, entire. Fig. 32. Head of female: r, internal ridges; s, sclerotization in cuticle. (Figs. 28 & 32 to same scale).

of muscular oesophagus; cervical papillae not identified with certainty.

Posterior end coiled, so position of anus and vulva obscured in most specimens. In one anus tail 300  $\mu\text{m}$ , and vulva at least 1 mm from posterior end. Eggs simple, 80 x 40  $\mu\text{m}$ .

The only other record of *Microtetrameres* from pelicans is that of *M. pelecani*, usually attributed to Skrjabin, 1949, from *Pelecanus onacrotalus* from Russia. This species was listed without description by Skrjabin, Schikhobalova & Sobolev (1949) as '*M. pelecani* Skrjabin'.



Figs 33-35. (Photomicrographs). *Tetrameres anseranus*. Fig. 33. Anterior end showing rudimentary flange, on each side of lateral ala. Fig. 34. Trifold cervical papilla beside lateral ala. Fig. 35. Head showing lips and teeth. The asymmetrically placed rounded 'warts' one on each of dorsal and ventral lips, were not seen in any other specimen, and are not considered of specific importance.

Fig. 36. *Tetrameres globosa*. Anterior end.

Skrjabin & Sobolev (1963) give description and figures of '*M. pelecani* Skrjabin, 1949', but the only reference given is that of Skrjabin *et al.* (1949). The Russian species appears to differ very little from *T. pelecani* (Johnston & Mawson 1942a), which however predates it.

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Holotype and Allotype specimens of new species are deposited in the South Australian Museum and other type material in the Australian Helminthological Collection in the South Australian Museum.

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